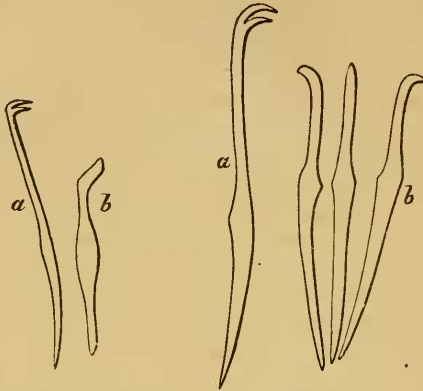


Among Polychætous Chætopoda the Syllidæ present very remarkable differences between the gemmiparous and sexually reproducing conditions, to which the cases here described make a small approach.

*Chatogaster Linnæi.**Nais serpentina.*

a. Normal uncinæte setæ; b, genital setæ.

XI.—*On the Early Stages in the Development of Phyllodoce maculata, Johnston.* By W. C. M'INTOSH, M.D., F.R.S.E., F.L.S.

[Plate VI.]

PROFESSOR SARS seems to have been amongst the first to notice the young of *Phyllodoce**, although he was unaware of the group of Annelids to which his young forms belonged. At the end of his paper on the development of *Polynoë cirrata*, Linn. (*Harmothoë imbricata*), he mentions that he had also found, off the Norwegian coast, in February and March, globules composed of irregularly rolled mucous ribands, which adhered to *Zostera marina* and *Fucus vesiculosus* at the depth of some feet. These mucous masses with their grass-green ova in all probability refer to the species hereafter to be described. He observed that the young, on their exit from the egg, had a central circlet of cilia and two kidney-shaped eyes of a bright-red colour. He does not mention a mouth, but states that the anus is at the posterior end of the body, and more visible than in the young of *Polynoë*. His figure is somewhat small and indistinct, but it would appear to repre-

* Wiegmann's Archiv, 1845, and Ann. Nat. Hist. 1845, vol. xvi. p. 187.

sent the animal just after it leaves the gelatinous investment and assumes a more elongated form. Dr. Max Müller*, in his description of *Sacconereis helgolandica*, refers in a footnote to a young *Phyllodoce* from Heligoland, which, however, had reached a recognizable condition, being furnished with twenty-six segments, each of which had the characteristic bristles and other appendages of the feet. Mr. Alex. Agassiz† lately added still further to our information on the subject by his remarks on the development of *Phyllodoce maculata*, Örsted, his description commencing at an earlier period than that referred to by Dr. Max Müller in his form,—viz. on the appearance of the tentacles, but before the advent of the bristles.

On the 15th of May various examples of the adult Annelids, loaded with ova and spermatozoa, were received from St. Andrew's; and each very soon deposited the green spawn on the sides of the vessel in a somewhat bulky, transparent, gelatinous mass, and discharged at the same time a copious cloud of spermatozoa. On deposition, the ova (Pl. VI. fig. 1) are of a fine grass-green colour, minutely granular, with a clear spot and a single thin investment. The bodies of the spermatozoa are shaped somewhat like a nine-pin, with a small rounded head, towards which the body tapers anteriorly, and with a blunt posterior extremity which gives origin to the long filament or tail (fig. 2).

To take for instance the ova deposited about 7 A.M. on the 18th, it is found at 9 A.M. that the yelk is separated into two masses (fig. 3), and moreover that, when moderate pressure is maintained for a time, a further division into four occurs (fig. 4), and in a few hours after all are found in the mulberry-stage. Next day the exterior of the ovum becomes distinctly ciliated, though the action is feeble and the organs short (fig. 5). There is no extrusion out of an egg-capsule in this case, the thin investment of the yelk being the only covering. The body is nearly round, and at first sight seems to be covered with cilia; but a brief examination in various positions shows that these organs are arranged thus:—A belt of cilia entirely surrounds the body, a long brush springs from a point a little behind the anterior border, and a shorter tuft of scarcely projecting cilia marks the large aperture in the posterior region. The cilia of the ring gradually increase in length and power; so that swarms of the young leave the gelatinous mass and congregate on the bottom of the vessel like a green powder. On the third day they have become much more lively, and two eyes also appear (fig. 6). When, in this stage, the animal is viewed from

* Archiv für Anat. 1855, p. 17.

† Ann. Nat. Hist. ser. 3. vol. xix. p. 249, 1867.

the anterior end or snout (fig. 7), it is found to be surrounded by a ring of cilia, and to have the digestive tract clearly defined as a more opaque central mass, the eyes, in this position, being placed outside the latter. Next day their powers of progression have still further increased, and they course throughout the vessel like a swarm of dancing particles. Instead of being nearly circular, the body is now more elongated (fig. 8), the anterior end being blunter and rounder, the posterior somewhat more tapered. A distinct constriction marks the seat of the ciliated belt. When viewed from the front, the rounded anterior end presents the appearance shown in fig. 9, the very great length of the cilia being in strong contrast with the drawing of the same aspect at an earlier period. The body is cellulo-granular, opaque in the centre, more translucent at the edges, and, when crushed, resolves itself into nucleated cells and granules (fig. 10). The anterior brush of cilia is placed at some distance behind the anterior end, apparently on the same surface as the large ciliated aperture, and hence is not well seen unless the animal is turned round on one side, as in fig. 11. The anterior region of the digestive canal is richly ciliated, and under favourable pressure becomes everted (fig. 12), but by what aperture (natural or artificial) I have not yet been able to determine with precision.

During the subsequent days, the body becomes more elongated, the cutaneous tissues are differentiated, and the digestive tract especially assumes a definite shape. Coarser granules and granular cells mark the latter under pressure; and it is also distinguished from the paler body-wall by its deep-green hue and the distinct contractions of its muscular investment. The animal now feeds, and the intestinal canal holds numerous granules and sand-particles. The large aperture towards the posterior end is surrounded by a strong belt of circular fibres. The anterior part of the body is still bluntly rounded; and the eyes are situated about midway between the tip and the ciliated ring. The cilia of the latter have much increased in length, so that under a powerful lens the animal somewhat resembles a winged wedge.

At the end of a fortnight they all showed a tendency to perish without further differentiation of textures; so that for the present the inquiry had to be relinquished.

Mr. Alex. Agassiz* makes a remark in regard to his form, the youngest of which was much older than the most advanced just described, which does not seem to coincide with my observations; for, in describing its structure, he says, "There is as yet no exterior communication from the digestive cavity,

* *Loc. cit.*

which is simply blocked out, occupying little more than two-thirds of the space in front of the vibratile ring and of the large shield extending behind it: when seen in profile (fig. 47, upper figure), the cavity is somewhat retort-shaped, and occupies mainly the dorsal portion of the embryo." In the much younger animals examined by me, the large aperture behind the ciliated ring is very conspicuous, and assumes various shapes in regard to contraction and dilatation. From the posterior border of this opening a series of short cilia proceed towards the tip of the body; but, as their distribution is limited, they are not very evident in all views. No aperture was seen at the posterior termination of the body, neither was any made out at the anterior ciliated tuft. This large aperture behind the ciliated ring (supposed by Prof. Sars to be the anus) would therefore appear to be the mouth—an interpretation in accordance with what is found in other young Annelids, such as *Polynoë*. The ciliated ring is a very common arrangement in the Annelidan young, the homologue thereof appearing even in the Nemerteans, for instance, in the temporary tufts of long cilia on the snout (in front of the mouth) of the developing *Cephalothrix filiformis*. The Nemertean young are ciliated all over—a distinction between them and the Annelids, however, that has exceptions. A. Krohn and A. Schneider*, for example, describe a young bristled form from the Mediterranean, entirely covered with cilia in the early stage.

EXPLANATION OF PLATE VI.

- Fig. 1.* Newly deposited ovum of *Phyllodoce maculata*, Johnst., surrounded by spermatozoa, $\times 350$ diameters.
Fig. 2. Spermatozoa of the same species, drawn under a power of 700 diameters.
Fig. 3. The ovum, with the yolk separated into two divisions, $\times 350$ diams.
Fig. 4. The same, separated into four divisions, $\times 350$ diams.
Fig. 5. Rounded embryo shortly after the appearance of the cilia, $\times 350$ diams.
Fig. 6. Embryo somewhat older, and having two eyes, and longer oral and lateral tufts of cilia (the latter of course arising from the ciliated ring under pressure), $\times 350$ diams.
Fig. 7. A younger embryo than the foregoing, viewed from the anterior end, and slightly compressed. The digestive chamber is clearly mapped out.
Fig. 8. Embryo about five days old, seen from above, almost in its normal state as regards pressure, $\times 350$ diams.
Fig. 9. The same, viewed from the anterior end, uncompressed, $\times 350$ diams.
Fig. 10. Elements of compressed and disintegrated animal, \times about 700 diams.

* Archiv für Anat. 1867, p. 498, Taf. 13. f. 1 & 2.

Fig. 11. Embryo of the same age as fig. 8, turned round and much compressed, so as to exhibit the anterior whip of cilia and the large aperture behind the vibratile ring, $\times 350$ diams.

Fig. 12. One of the same age, in which compression has forced out the ciliated proboscis, $\times 350$ diams.

XII.—*Descriptions of five new Species of Birds from Queensland, Australia; and a new Humming-bird from the Bahamas.* By JOHN GOULD, F.R.S. &c.

Eopsaltria leucura, Gould, n. sp.

Forehead, lores, and a line nearly surrounding the eye and the ear-coverts black; head and upper surface dark leaden grey, fringed posteriorly with greyish white; wings blackish brown, darkest on the shoulders; upper tail-coverts black; two centre tail-feathers black; the next on each side black, with a stripe of white on the basal part of the shaft and outer web; the remaining four on each side white at the base, and black for the remainder of their length; all the under surface and the under tail-coverts white, with the exception of a broad band of pale grey across the breast; bill and feet black.

Total length $6\frac{1}{2}$ inches, bill $\frac{13}{16}$, wing $3\frac{1}{4}$, tail 3, tarsi 1.

Habitat. The Cape-York district.

Remark. This is the largest species of the genus yet discovered; it is somewhat allied to the *Eopsaltria leucogaster* of Western Australia, but is distinguished from that and every other known species by the white at the basal portion of the lateral tail-feathers.

I have for a long time entertained a belief that there is yet another undescribed species of *Eopsaltria* inhabiting Queensland and the eastern portion of New South Wales—in other words, or to make the matter more clear, that there are three yellow-bellied species resident in the southern and eastern portions of Australia. If this opinion be correct, I have committed the error of figuring the undescribed one in my folio work on the birds of that country under the erroneous specific appellation of *australis*.

The three species may be thus defined:—

Eopsaltria australis.

Crown of the head, nape, and ear-coverts grey; rump dull wax-yellow; chin greyish white; under surface bright yellow.

Syn. *Muscicapa australis*, Lath. Ind. Orn. Suppl. p. li.

Southern Motacilla, *Motacilla australis*, White's Journ. pl. at p. 239.